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## EUROPEAN PATENT APPLICATION

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### (54) **Attaching an electronic circuit to a substrate**

(57) Integrated circuits such as transponders (10) are attached to a substrate (28) such as cardboard packaging material by adhering an integrated circuit to the substrate, applying a patch antenna (18) to the substrate and the integrated circuit, and applying a sealing layer (40) over the integrated circuit and at least a portion of the antenna. In variations of the method, an in-

dentation (34) may be formed in the substrate into which the integrated circuit is placed. The patch antenna may be screen printed onto the substrate and the integrated circuit, using conductive ink, or may be a metallic foil which is applied to the substrate and the integrated circuit. Where the integrated circuit is a transponder, it can be programmed with an identification code, either before or after being attached to the substrate.

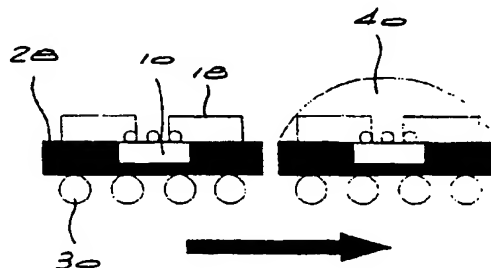


Figure 6

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## EUROPEAN SEARCH REPORT

Application Number  
EP 94 30 1777

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	EP-A-0 079 047 (BROWN,BOVERI & CIE) * page 7, line 8 - line 17 *	1,32	G06K19/077 G06K7/08 H01L21/60
A	US-A-4 546 357 (LAUGHON T.C. ET AL.) * claim 1 *	2	
A	--- PATENT ABSTRACTS OF JAPAN vol. 17, no. 32 (E-1309), 21 January 1993 & JP-A-04 252523 (MITSUBISHI ELECTRIC CORP.), 8 September 1992, * abstract *	3	
A	--- MICROWAVE JOURNAL, vol. 19, no. 10, October 1976, USA, pages 47-49, XP002007867 GREISER,J.W.: "COPLANAR STRIPLINE ANTENNA" * column 2 * * figure 1B *	2	
A	--- DE INGENIEUR, vol. 84, no. 24, 16 June 1972, NL, pages 74-80, XP002007868 FLACHENECKER,G. ET AL.: "ACTIVE RECEIVING ANTENNAS" * page 76; figure 4 *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.5)  G06K H01Q
A	--- PATENT ABSTRACTS OF JAPAN vol. 13, no. 34 (E-708), 25 January 1989 & JP-A-63 234601 (FUJITSU TEN LTD), 29 September 1988, * abstract *	7	
A	--- GB-A-2 100 669 (GAO GES FUR AUTOMATION UND ORGANISATION MBH) * abstract *	12,13	
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 9 July 1996	Examiner Herskovic, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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### CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid.  
namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

### LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions,  
namely:

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- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid.  
namely claims:
- ☐ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims.  
namely claims:



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# EUROPEAN SEARCH REPORT

Application Number  
EP 94 30 1777

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	GB-A-2 081 974 (GAO GESELLSCHAFT FUR AUTOMATION UND ORGANISATION MBH) * claim 1 *	14	
A	INTERNATIONAL ELECTRONIC MANUFACTURING TECHNOLOGY SYMPOSIUM, 26 - 28 April 1989, NARA, JAPAN, pages 101-104, XP000077902 WATAHIKI, S. ET AL.: "NEW PACKAGING TECHNOLOGY OF SUPER SMART CARD" * figure 1 *	16, 18	
A	DE-A-41 05 869 (SCHNEIDER, E.) * figure 2 *	17	
A	EP-A-0 412 893 (SCHLUMBERGER INDUSTRIES) * claims 1, 11 *	19-21, 27, 32	
A	EP-A-0 436 497 (TREND PLASTICS, INC.) * claims 5, 6 *	22	
A	US-A-4 004 133 (HANNAN, W.J. ET AL.) * claim 1 *	24	
A	GB-A-2 208 058 (ELECTROMATIC (PROPRIETARY) LTD) * claim 15 *	24	
A	US-A-3 755 803 (COLE, P.H. ET AL.) * column 2, line 34 - line 37 *	28	
A	FR-A-2 336 741 (KREFT, H.D.) * claim 11 *	29	
A	EP-A-0 268 089 (ETA S.A. FABRIQUES D'EBAUCHES) * column 4, line 21 - line 22 *	4	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 9 July 1996	Examiner Herskovic, M
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>I : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

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EP 94301777-B-

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

**Subject 1: Claims 1-3, 27-32**

Method of attaching an electronic circuit or a packaging component comprising an integrated circuit to a substrate and applying a conductive element (layer of conductive ink comprising carbon or metallic particles) to define an antenna contacting at least 2 electrical terminals of the electronic circuit and the corresponding identification tag.

**Subject 2: Claims 1, 4-11, 27-32**

Method of applying a metallic foil to contacting the electrical terminals of an integrated circuit or a packaging component comprising an integrated circuit and securing together on a substrate whether with a conductive adhesive or applying solder and the corresponding identification tag.

**Subject 3: Claims 1, 12-17, 27-32**

Method of attaching an electronic circuit or a packaging component comprising an integrated circuit on a substrate by forming a cavity in the substrate made by punching, moulding, application of a heated tool, to receiving the electronic circuit; by heating the electronic circuit and pressing it in the substrate and the corresponding identification tag.

**Subject 4: Claims 1, 18-20, 26, 27-32**

Packaging component comprising an integrated circuit and method of applying a protective coating or enclosure over the integrated circuit and over a portion of the antenna, said enclosure comprising a layer of a settable sealant or a label and the corresponding identification tag.

**Subject 5: Claims 1, 21-25, 27-32**

Packaging component comprising an integrated circuit and method of attaching to a substrate the integrated circuit which is programmable with an identity code and the corresponding identification tag.



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Application Number  
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	EP-A-0 132 183 (SLIGOS) * claim 1 *	15	
A	EP-A-0 246 744 (TOSHIBA K.K.) * claims 1,2 *	10	
A	EP-A-0 449 691 (SCHLUMBERGER INDUSTRIES) * claim 1 *	5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>9 July 1996</b>	Examiner <b>Herskovic, M</b>
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons  .....  &amp; : member of the same patent family, corresponding document</p>			

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